CONSIDER OLYMPOS

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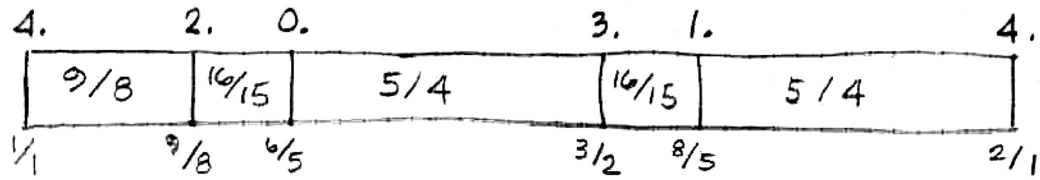
Many of the scales we use, or, at least know about, can be treated as a chain of variable Fourths, having, nevertheless, a specific tolerance, and a closing Fourth, which may be quite atypical in size. The Fourths, including the closing Fourth, will uniformly subtend a given number of scale degrees.

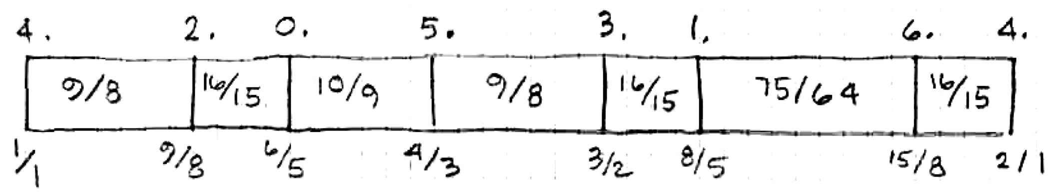
Consider Olympos in its pentatonic form;



This kind of scale can be designated a $\frac{2}{5}$ scale; meaning the scale has 5 degrees, and the generating interval (Variable Fourth) subtends 2 degrees. The series of Fourths is thus;

0.	1.	2.	3.	4.	0.
$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$(\frac{6}{5})$ closing Fourth	

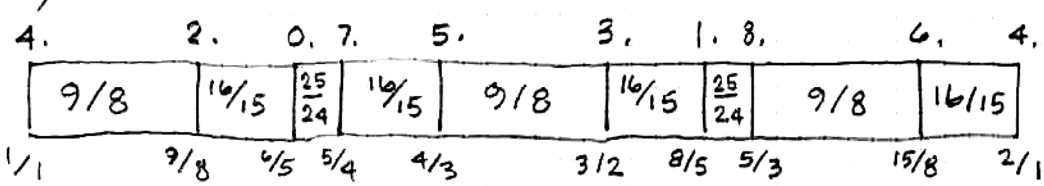
An extension of this series of variable Fourths, by repetition, projects into a 7-tone scale;



This scale is a $\frac{3}{7}$ scale, where the 8ve subtends 7 degrees, and the generating interval subtends 3. The series of Fourths is;

0.	1.	2.	3.	4.	5.	6.	0.
$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{45}{32}$	$(\frac{16}{25})$ closing Fourth	

A further extension of this repeating series leads into a 9-tone scale;



This can be seen, then, as a $\frac{4}{9}$ scale, where the 8ve subtends 9 degrees and the generating interval subtends 4 (as does, most importantly, the closing interval). The generating series of variable Fourths is:

0.	1.	2.	3.	4.	5.	6.	7.	8.	0.
$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$\left(\frac{36}{25}\right)$ closing Fourth	

Because of the fluctuation in the size of the generating interval, this ends the practical application of the progression $\frac{2}{5}$, $\frac{3}{7}$, $\frac{4}{9}$.

The 7-tone and 9-Tone Scales serve as tonal systems in which preceding hierarchical scales may be, in some permutation, modulated. Here is shown the pentatonic modulating around its 7-tone descendent:

4. 2. 0. 5. 3. 1. 6. 4.

9/8	16/15	10/9	9/8	16/15	75/64	16/15	← Break
9/8	16/15	5/4	16/15	5/4			1
9/8	32/27	9/8	16/15	5/4			3
9/8	32/27	9/8	5/4	16/15			2
6/5	10/9	9/8	5/4	16/15			
6/5	10/9	6/5	75/64	16/15			4
16/15	10/9	6/5	75/64	6/5			
16/15	5/4	16/15	75/64	6/5			

Of special interest are the permutations of $\frac{45}{32}$ $\frac{4}{3}$ $\frac{4}{3}$ $\frac{4}{3}$ $\left(\frac{6}{5}\right)$, these are 4;

0.	1.	2.	3.	4. 0.	4. 2.	0.		3.	1. 4.	
$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\left(\frac{6}{5}\right)$	9/8	16/15	5/4	9/8	32/27	3.
$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\frac{4}{3}$	$\left(\frac{6}{5}\right)$	9/8	16/15	5/4	16/15	5/4	1
$\frac{4}{3}$	$\frac{4}{3}$	$\frac{45}{32}$	$\frac{4}{3}$	$\left(\frac{6}{5}\right)$	16/15	9/8	5/4	16/15	5/4	
$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{45}{32}$	$\left(\frac{6}{5}\right)$	16/15	9/8	32/27	9/8	5/4	2

These are a perennial, classic set.

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There is the alternate possibility of $\frac{6}{5}\ \frac{4}{3}\ \frac{4}{3}\ \frac{4}{3}$, of which there are 4;

0.	1.	2.	3.	4.	0.
$\frac{6}{5}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\left(\frac{45}{32}\right)$	
$\frac{4}{3}$	$\frac{6}{5}$	$\frac{4}{3}$	$\frac{4}{3}$		
$\frac{4}{3}$	$\frac{4}{3}$	$\frac{6}{5}$	$\frac{4}{3}$		
$\frac{4}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{6}{5}$		

4. 2. 0. 3. 1. 4.

$\frac{9}{8}$	$\frac{5}{4}$	$\frac{16}{15}$	$\frac{9}{8}$	$\frac{32}{27}$
$\frac{9}{8}$	$\frac{5}{4}$	$\frac{16}{15}$	$\frac{5}{4}$	$\frac{16}{15}$
$\frac{5}{4}$	$\frac{9}{8}$	$\frac{16}{15}$	$\frac{5}{4}$	$\frac{16}{15}$
$\frac{5}{4}$	$\frac{9}{8}$	$\frac{32}{27}$	$\frac{9}{8}$	$\frac{16}{15}$

A set of permutations of the 7-tone scale is as follows;

	0.	1.	2.	3.	4.	5.	6. 0.
1.	$\boxed{45/32}$	4/3	$\boxed{45/32}$	4/3	4/3	4/3	(32/16)
2.	$\boxed{45/32}$	4/3	4/3	$\boxed{45/32}$	4/3	4/3	
3.	$\boxed{45/32}$	4/3	4/3	4/3	$\boxed{45/32}$	4/3	
4.	$\boxed{45/32}$	4/3	4/3	4/3	4/3	$\boxed{45/32}$	
5.	4/3	$\boxed{45/32}$	4/3	$\boxed{45/32}$	4/3	4/3	
6.	4/3	$\boxed{45/32}$	4/3	4/3	$\boxed{45/32}$	4/3	
7.	4/3	$\boxed{45/32}$	4/3	4/3	4/3	$\boxed{45/32}$	
8	4/3	4/3	$\boxed{45/32}$	4/3	$\boxed{45/32}$	4/3	
9.	4/3	4/3	$\boxed{45/32}$	4/3	4/3	$\boxed{45/32}$	
10.	4/3	4/3	4/3	$\boxed{45/32}$	4/3	$\boxed{45/32}$	

6. 4. 2. 0. 5. 3. 1. 6

1.	9/8	16/15 ⊙ 16/15	75/64	9/8	16/15 ⊙ 10/9	
2.	9/8	16/15 ⊙ 16/15	75/64	16/15 ⊙ 9/8 ⊙ 10/9		
3.	16/15 ⊙ 9/8 ⊙ 16/15	75/64	16/15 ⊙ 9/8 ⊙ 10/9			
4.	16/15 ⊙ 9/8 ⊙ 16/15	10/9 ⊙ 9/8 ⊙ 9/8 ⊙ 10/9				
5.	9/8	16/15 ⊙ 16/15	75/64	16/15 ⊙ 16/15	75/64	
6.	16/15 ⊙ 9/8 ⊙ 16/15	75/64	16/15 ⊙ 16/15	75/64		
7.	16/15 ⊙ 9/8 ⊙ 16/15	10/9 ⊙ 9/8 ⊙ 16/15	75/64			
8.	16/15 ⊙ 16/15	9/8	75/64	16/15 ⊙ 16/15	75/64	
9.	16/15 ⊙ 16/15	9/8	10/9 ⊙ 9/8 ⊙ 16/15	75/64		
10.	16/15 ⊙ 16/15	9/8	10/9 ⊙ 16/15	9/8	75/64	

These are immortal scales descended from Olympos. Most common tonics are shown thus ⊙. But you may have you own ideas of where tonic pleases you. All ten of these were accessible to the Persians in their 17-tone tuning (give or take a skhisma). They all made it over to India as raga scales but in a slightly modified form apparently occasioned by the use of only 12 frets rather than 17. The Indian permutations a thus; (see conn book)

But --- wait a minute, lets go back to Olympos, or an inversion of it:

4. 2 0. 3. 1. 4.

5/4	9/8	16/15	5/4	16/15

The series of Fourths might be seen as:

0. 1. 2. 3. 4. 0.

$\frac{4}{3}$ $\frac{4}{3}$ $\frac{6}{5}$ $\frac{4}{3}$ $\left(\frac{45}{32}\right)$ closing Fourth

An extension of this series by repetion leads to an 8-tone scale

4. 7. 2. 5. 0. 3 6. 1. 4.

16/15	75/64	16/15	135/128	16/15	32/27	135/128	16/15

0. 1. 2. 3. 4. 5. 6. 7. 0.

$\frac{4}{3}$ $\frac{4}{3}$ $\frac{6}{5}$ $\frac{4}{3}$ $\frac{4}{3}$ $\frac{4}{3}$ $\frac{6}{5}$ $\left(\frac{675}{512}\right)$ closing Fourth

lets try this inversion so we can compare it with fig ( ).

2. 5. 0. 3. 6. 1. 4. 7. 2.

16/15	135/128	16/15	32/27	135/128	16/15	16/15	75/64

9/8	16/15	5/4	16/15	5/4
16/15	9/8	5/4	16/15	5/4
16/15	9/8	32/27	9/8	5/4
9/8	32/27	9/8	16/15	5/4
135/128	512/405	9/8	16/15	5/4
135/128	512/405	135/128	256/225	5/4
9/8	512/405	135/128	256/225	75/64
9/8	16/15	5/4	256/225	75/64

To beginning

But one pales to look at the tonal universe from this vantage point!